

U.S. Patent Application Serial No. 10/724,171
Response to Office Action dated September 9, 2005

REMARKS

Claims 3-18 are pending in this application, of which claims 4, 8, 11 and 16 have been amended. Claims 1-2 have been canceled. No new claims have been added.

The Examiner has objected to the drawings for failing to show reference "I" and position "X" recited in claim 11.

Applicant respectfully disagrees. FIG. 5 clearly shows how the moment of inertia as to bending (I1, I2, ... I5) varies with current height position (X) in tooth (30, 40).

Accordingly, claim 11 has been amended to clarify this feature.

The Examiner has noted that claim 4 recites "the second relief angle (E) that is smaller than the first relief angle (D) of the flank area (43), which is inconsistent with FIG. 3, which shows angle (E) to be greater than angle (D).

Accordingly, claim 4 has been amended to correct this inequality.

The Examiner has objected to the Abstract for containing legal phraseology, e.g., "comprising."

Applicant respectfully disagrees. The Abstract was amended in the previous response filed June 6, 2005 to eliminate the word "comprising" and other legal phraseology.

The Examiner has rejected the specification under 35 U.S.C. § 112, first paragraph, as being replete with terms which are not clear, concise and exact. The Examiner has specifically cited the terms "geometric function" and "growth function."

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It is well known to those of ordinary skill in the art that a geometric function, strictly speaking, refers to any function which follows a predetermined law defining a curve, for instance, a straight line, a circle, a parabolic line, an S-shaped line, etc. Applicant is unable to locate the term “growth function” on page 16 of this specification, as indicated by the Examiner.

Claims 1-18 stand rejected under 35 U.S.C. § 112, second paragraph, as indefinite. The Examiner has specifically cited the relationship between first and second relief angles as recited in claims 4 and 16 as being inconsistent with the drawings.

Accordingly, claims 4 and 16 have been amended to recite the relationship between first and second relief angles as shown in the drawings.

Thus, the 35 U.S.C. § 112, second paragraph, rejection should be withdrawn.

The Examiner has cited the following examples of unclear claim language not clearly supported in the specification and drawings:

1. Regarding Claim 8, Applicant recites “increases as a function of the bevel angle, ... has different surfaces...”;
2. Regarding Claim 9, Applicant recites “function of increase representing the sine of the bevel angle”;
3. Regarding Claim 10, Applicant recites “function of increase”;
4. Regarding Claim 11, Applicant recites “smooth curve of moment of inertia as to bending (I), as a function of a current height position X”; and
5. Regarding Claim 14, Applicant recites “smoothing function ... variation in the

moment of inertia...”.

Accordingly, claims 8 and 11 have been amended to correct the noted instances of indefiniteness. Support may be found in the specification at page 5, lines 10-19 for item no. 5 discussed above. To further clarify item no. 5, attached hereto is a reference drawing, which consists of the right side of FIG. 6 of U.S. Patent 4,993,893, which has been modified according to the instant invention, and FIG. 6 is inverted left/right.

Precisely, if the tooth, seen from above (or under as in FIG. 6), looks like a V (or U) profile, V1, i.e., becomes wider from the tip (on left side on the figures) to the base (connecting part with the bulk forward volume part 30A), each branch presenting a bevel angle, which can be named B1, versus a central line of V1, said line being a horizontal line on FIGS. 3, 4. The inertia (or flexion) moment becomes greater at the base (on right side) of the tooth, i.e., at the level of the vertical plane, perpendicular to the plane of FIGS. 3, 4 joining the ends of the branches. In order to limit (smooth) this inertia increase, the sides 31F or 41F become more slanted, i.e., inclined on a vertical plane containing the related branch. This is the relief angle.

In short, a horizontal intermediate plane, at the level of back end 44, would cut the bottom of the tooth by delimiting an intermediate V profile, V0, but with an intermediate bevel angle B1 when going towards their ends, on the right side of FIGS. 3, 4 or FIG. 6: a branch of intermediate V0 diverges versus the corresponding branch of upper V1. Consequently, in this intermediate plane, the base of the tooth exhibits a strongly reduced width W0 (in a direction perpendicular to FIG. 3, i.e., vertical on FIG. 6) as compared with the “upper width” W1 of the

upper part of the tooth at the level of face 41. Thus, the inertia moment is not so important as if the intermediate V0 profile were as wide as the upper V1 profile.

In other words, the width difference, between the branches of respective upper V1 and intermediate V0, increases, due to divergence, when going towards the base of the tooth. Consequently, the relief angle of flank 41F (the cutting line by a vertical plane perpendicular to FIG. 3) increases towards the base of the tooth: in FIG. 6, the base part (right part) of flank 41F looks wider, as seen from under, than the tip part.

Claims 3-18 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 4,993,893 to Niebauer (hereafter, “Niebauer”) in view of U.S. Patent 5,755,536 to Vollmer et al. (hereafter, “Vollmer et al.”).

Applicant respectfully traverses this rejection.

Niebauer discloses an improved cutting insert for threading applications having chip control features and including an insert body having end wall regions, sides and top and bottom walls adapted for mounting in a pocket in a holder. The insert body has cutting edges and a notch in the top and bottom sides. The end wall regions each comprise two end walls converging toward one another as they extend from the insert’s sides, forming at the juncture with the respective top and bottom walls, a cutting edge. The chip control geometry including a recess defining, when viewed in plan, a generally “V” shaped depression having the bottom of the “V” proximate the tip of the cutting edge. The extending arms of the “V” are distal the cutting edge tip and are crowned by a pair of backramps.

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The Examiner has admitted that Niebauer fails to teach the following:

1. Bracing part (14) connecting to the flank area (34) through a transition (curved) portion having a third relief angle;
2. The profile of the flank area being curvilinear; and
3. The insert having an S-shaped set back.

The Examiner has cited Vollmer et al. for teaching these features, except he has admitted that Vollmer et al. fails to teach the transitional face (13) being curved or the flank area having a curvilinear profile. The Examiner has indicated that, absent criticality or unexpected results, such a curved shape would be obvious to one of ordinary skill in the art.

Applicant respectfully disagrees. Page 4, lines 1-16 of the specification disclose the advantages of the curve section 45, which are not taught in either of Niebauer or Vollmer et al.

In particular, Niebauer does not teach a spur (line 3). The “spur” drawn on page 7 exhibits no acute angle, as opposed to the tip of lines 36', 46'. As to claim 8 (last two lines on page 6), Niebauer teaches end walls 30, 32 which are flat, since they are limited by straight lines: “vertical” line 14, horizontal upper line and “vertical” line limiting lateral face 18. See also FIG. 6, right part, where the respective branches of “upper” V (pointing in 28) and of the “lower” V (the tip of which is truncated by surface 34) are parallel, thus delimiting planes for end walls 30, 32.

The explanation of the Examiner relating his drawing and to the sine of the bevel angle is not understood. Applicant does not perceive a sine. In any event, a sine would be of no interest,

since groove 52 is for engagement by a toolholder (column 4, lines 11-16), it has no relationship with a cutting function as for the tooth of pending claim 3. The rounded bottom of groove 52 is only for limiting the wear by the clamping nose.

As to Vollmer et al., and relating to page 8, second paragraph of the Office Action, Applicant provided information as to the advantage of having no discontinuities in the moment of inertia, on page 4, line 31 to page 5, line 3, indicating that any localized stress is so limited. Such discontinuities would be present if there was a sudden change in the surface value of the cross-section of the tooth. Consequently, if a curved portion (45) is provided between the (first) profile 43 of the forward volume 40A and the second profile 45, 46 of the bracing part 40B as in pending claim 3, it can be arranged for merging smoothly, at both ends of it, with the respective profiles 43 and 46, i.e., without angularity. Consequently, the cross-section of the tooth will vary smoothly, and the same for the moment of inertia. This explanation is found on page 13, lines 17-21.

Consequently, Applicant stated the problem to be solved and provided the advantage and the proposed solution.

As to the last paragraph of page 8 of the Office Action, the problem of Vollmer et al. was to limit the wear of the insert to a well defined upper region, by defining a setback. It has no relationship with the above-mentioned problem relating to the moment of inertia. Although the two problems are solved by respective solutions which are “near” each other, the paths for accessing these solutions have no common part, since the starting points (i.e., the specific

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problem) of each path are dissimilar. The Vollmer et al. problem of feeding force is of no concern in the present invention.

None of the prior art deals with the instant problem of discontinuities in the evolution of the moment of inertia. The present inventor stated the problem of localized stress, and solved it by the curved portion 45.

Thus, the 35 U.S.C. § 103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 3-18, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

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Respectfully submitted,

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Attachment: Drawing Figure

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Feb, 19, 1991

Sheet 3 of 3

4,993,893

Fig. 6

upper width
W₁
intermediate
width
W₀

1/2 width

difference

41F V₁

V₀

24

bevel B₁

bevel B₀

43
45
46

V₁

V₀